

WHAT IS CLAIMED IS:

1. A separator for use with a surgical device that separates corneal epithelium from Bowman's layer, the surgical device including a positioning ring for temporary attachment to the eye, a separator assembly structured and disposed to carry said separator across the positioning ring, said separator having a polymeric separating edge that separates the corneal epithelium from the Bowman's layer as the separator moves across the positioning ring.
2. A separator as claimed in Claim 1, where said separating edge is not sufficiently sharp to sever Bowman's layer.
3. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material selected from acetals, (meth)acrylates, acrylics, alkyds, polycarbonates, polyolefins, polyesters and co-polyesters, polymethylpentene, polypropylene, polysulfones, cellulose, styrene acrylic co-polymers, fluoropolymers, nylons, polystyrene, polyetheretherketones (PEEK), polyarylates, polyetherimides, styrene acrylonitrile, silicones, epoxys, polyvinyl chloride, urethanes, acrylonitrile-butadiene-styrene (ABS), methylmethacrylate-acrylonitrile-butadiene-styrene (MABS), allyl diglycolcarbonate, and combinations thereof.
4. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material selected from polycarbonates, PEEK, polystyrenes, MABS, acetal homopolymers, PMMA, and combinations thereof.
5. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material having a flexural modulus of at least about 1.5 GPa according to ASTM D790.
6. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material having a tensile strength at yield of at least about 25 MPa according to ASTM D638.

7. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material having either a Rockwell M hardness greater than or equal to 70, or a Rockwell R hardness greater than or equal to 90, according to ASTM 785.
8. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material having a toughness of at least about 1 J/cm^2 , according to ISO 179 Charpy Impact Test, unnotched at 23 °C.
9. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material and an inorganic filler material selected from carbon powder, carbon fibers, glass powder, glass fibers, and combinations thereof.
10. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a transparent material.
11. A separator as claimed in Claim 10, wherein said transparent material has a light transmission greater than about 50 percent, and a haze factor less than about 25 percent, in accordance with ASTM D1003.
12. A separator as claimed in Claim 10, wherein said transparent material further comprises a tinting agent.
13. A separator as claimed in Claim 1, wherein said polymeric separating edge comprises a polymeric material having a Vicat softening point, measured by ASTM D1525, of less than 120 °C.
14. A separator for separating corneal epithelium from Bowman's layer in a cornea of an eye, said separator comprising a polymeric separating edge that will not cut into Bowman's layer as the separator separates the corneal epithelium from the Bowman's layer.

15. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises an acetal, an acrylic, an alkyd, a polycarbonate, a polyesters or co-polyester, polymethylpentene, polypropylene, a polysulfone, a cellulosic, a styrene acrylic copolymer, a fluoropolymer, nylon, polystyrene, a polyetheretherketone (PEEK), a polyarylate, a polyetherimide, styrene acrylonitrile, a silicone, epoxys, polyvinyl chloride, a urethane, acrylonitrile-butadiene-styrene (ABS), methylmethacrylate-acrylonitrile-butadiene-styrene (MABS), allyl diglycolcarbonate, or a combination thereof.

16. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises polycarbonate, PEEK, polystyrene, MABS, an acetal homopolymer, PMMA, or a combination thereof.

17. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises a material having a flexural modulus of at least about 1.5 GPa according to ASTM D790.

18. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises a material having a tensile strength at yield of at least about 25 MPa according to ASTM D638.

19. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises a material having either a Rockwell M hardness greater than or equal to 70, or a Rockwell R hardness greater than or equal to 90, according to ASTM 785.

20. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises a material having a toughness of at least about 1 J/cm^2 , according to ISO 179 Charpy Impact Test, unnotched at 23 °C.

21. A separator as claimed in Claim 14, wherein said polymeric separating edge further comprises an inorganic filler material selected from the group of carbon powder, carbon fibers, glass powder, glass fibers, and combinations thereof.

22. A separator as claimed in Claim 14, wherein said polymeric separating edge is transparent.

23. A separator as claimed in Claim 22, wherein said polymeric separating edge comprises a material having a light transmission greater than about 50 percent, and a haze factor less than about 25 percent, measured in accordance with ASTM D1003.

24. A separator as claimed in Claim 23, wherein said material further comprises a tinting agent.

25. A separator as claimed in Claim 14, wherein said polymeric separating edge comprises a material having a Vicat softening point, as measured by ASTM D1525, of less than 120 °C.

26. A separator for separating a corneal epithelium from an eye, at least a leading edge portion of the separator comprising a polymeric material, the leading edge portion of the separator having an edge thickness of at least about 200 microns.

27. The separator of Claim 26, further comprising at least one surface feature for coupling with a surgical device.

28. A disposable separator for separating a corneal epithelium from an eye, the separator having a leading edge with a radius of curvature of between about 5 microns and about 100 microns.

29. The disposable separator of Claim 28, wherein the radius of curvature of the leading edge of the separator is between about 10 microns and about 30 microns.

30. The disposable separator of Claim 28, wherein the radius of curvature of the leading edge of the separator is between about 15 microns and about 25 microns.

31. A method for separating at least a portion of an epithelium from a cornea of an eye, so that an intact Bowman's layer is exposed, said method comprising the steps of:

- (a) fixing a positioning ring to an eye so that the cornea at least partially extends therethrough;
- (b) moving a separator having a polymeric separating edge across at least a portion of the cornea to separate the epithelium from the cornea, leaving Bowman's layer intact; and
- (c) retracting the separator outside the positioning ring.

32. A method as claimed in Claim 31, further comprising the step of flattening at least a portion of the cornea prior to moving the separator along the travel path.

33. A method of preventing re-use of a surgical device for tissue separation, said method comprising forming at least a working edge portion of said surgical device of a polymeric material that will deform at a temperature of less than about 121° C.

34. The method of Claim 33, wherein the polymeric material of the working edge portion deforms at a temperature of less than about 100° C.